Deuteron Beam Profile from Polarimeter

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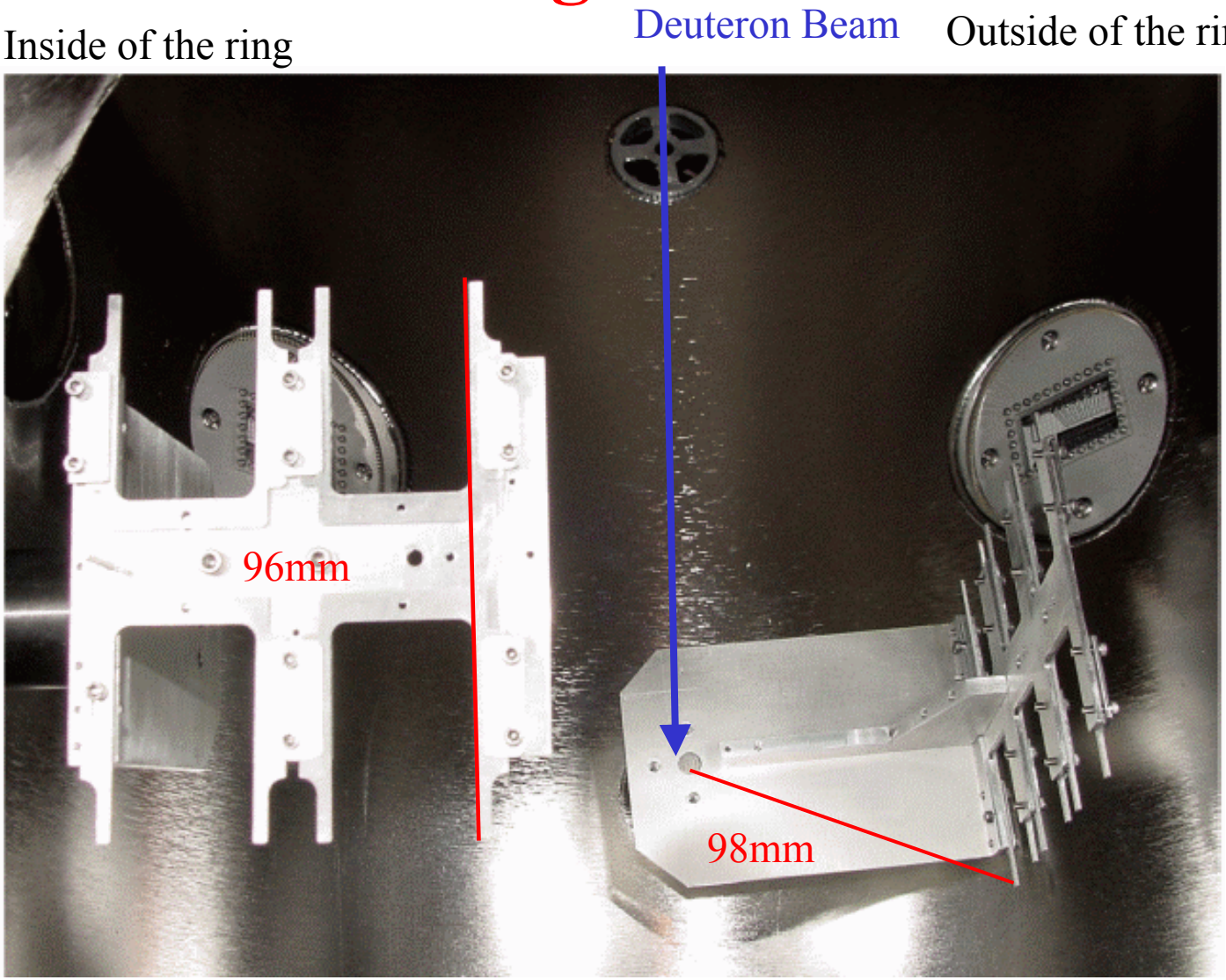
Jan. 25, 2008

Polarimeter Target Chamber



Both design drawing and target scan confirmed that the conversion coefficient is 730 counts/mm.

Horizontal Beam Profile (1 bunch)

BLUE

Start | Stop | Status: E-Target control error

Automatic / Manual

Time To Run: 300 | Number Events: 1500000

Horizontal | Vertical

Y-Rotary Target Position

Select Target: Target5 | Step Size: 600

Target Position: RotateOut | Max Steps: 24

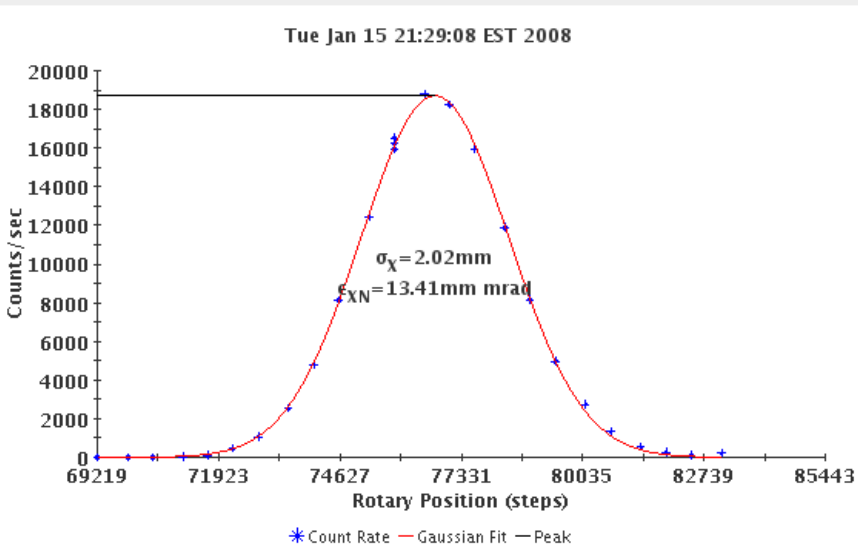
Center Position: 76500 | Offset: 7200

Position: 50000 [49923] | Time: 1.0

Count Rate

Current Value: 111 | Clear

Peak Count Position: 76745



YELLOW

Start | Stop | Status: OK

Automatic / Manual

Time To Run: 10 | Number Events: 10000000

Horizontal | Vertical

Y-Rotary Target Position

Select Target: <Select> | Step Size: 5

Target Position: Target5 | Max Steps: 10

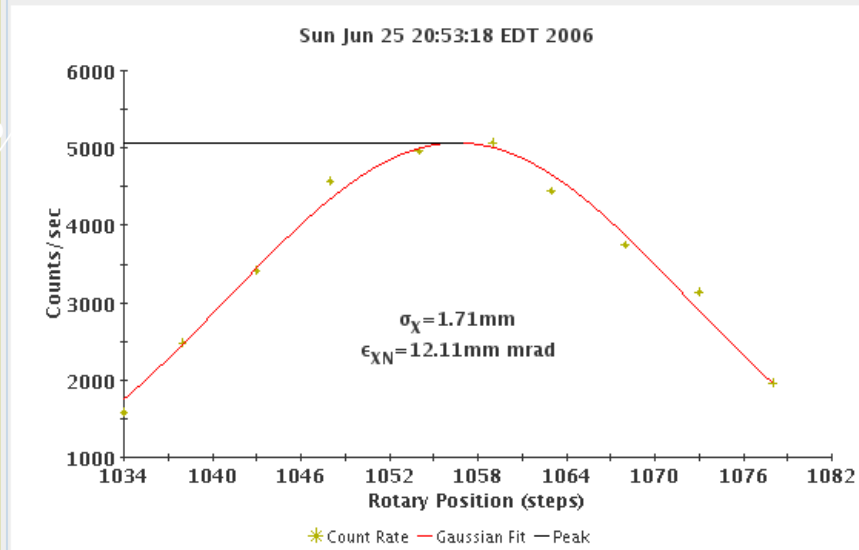
Center Position: 1050 | Offset: 25

Position: 0 [0] | Time: 1.0

Count Rate

Current Value: 0 | Clear

Peak Count Position: 1057



Horizontal Beam Profile (12 bunches)

BLUE

Start | Stop | Status: E-Target control error

Automatic / Manual

Time To Run: 300 | Number Events: 1500000

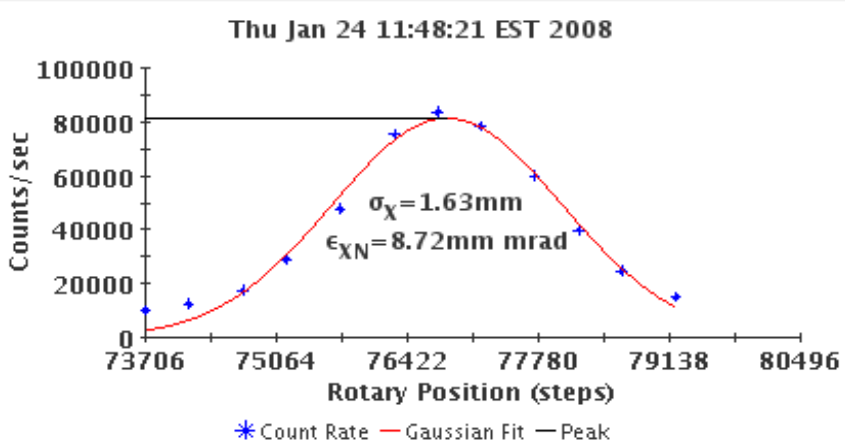
Horizontal | Vertical

Y-Rotary Target Position

Select Target	Target5	Step Size	500
Target Position	RotateOut	Max Steps	12
Center Position	76700	Offset	3000
Position	50000 [49923]	Time	1.0

Count Rate

Current Value: 15085 | Peak Count Position: 76834 | Clear



YELLOW

Start | Stop | Status: OK

Automatic / Manual

Time To Run: 10 | Number Events: 10000000

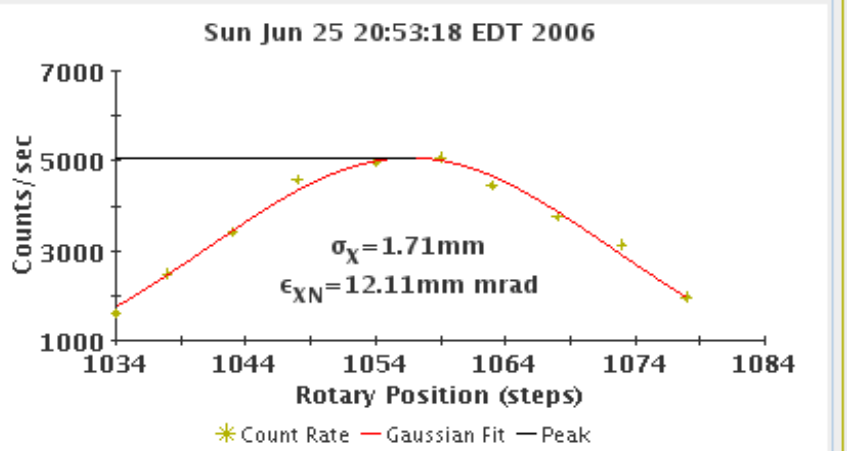
Horizontal | Vertical

Y-Rotary Target Position

Select Target	<Select>	Step Size	5
Target Position	Park	Max Steps	10
Center Position		Offset	25
Position	0 [1]	Time	1.0

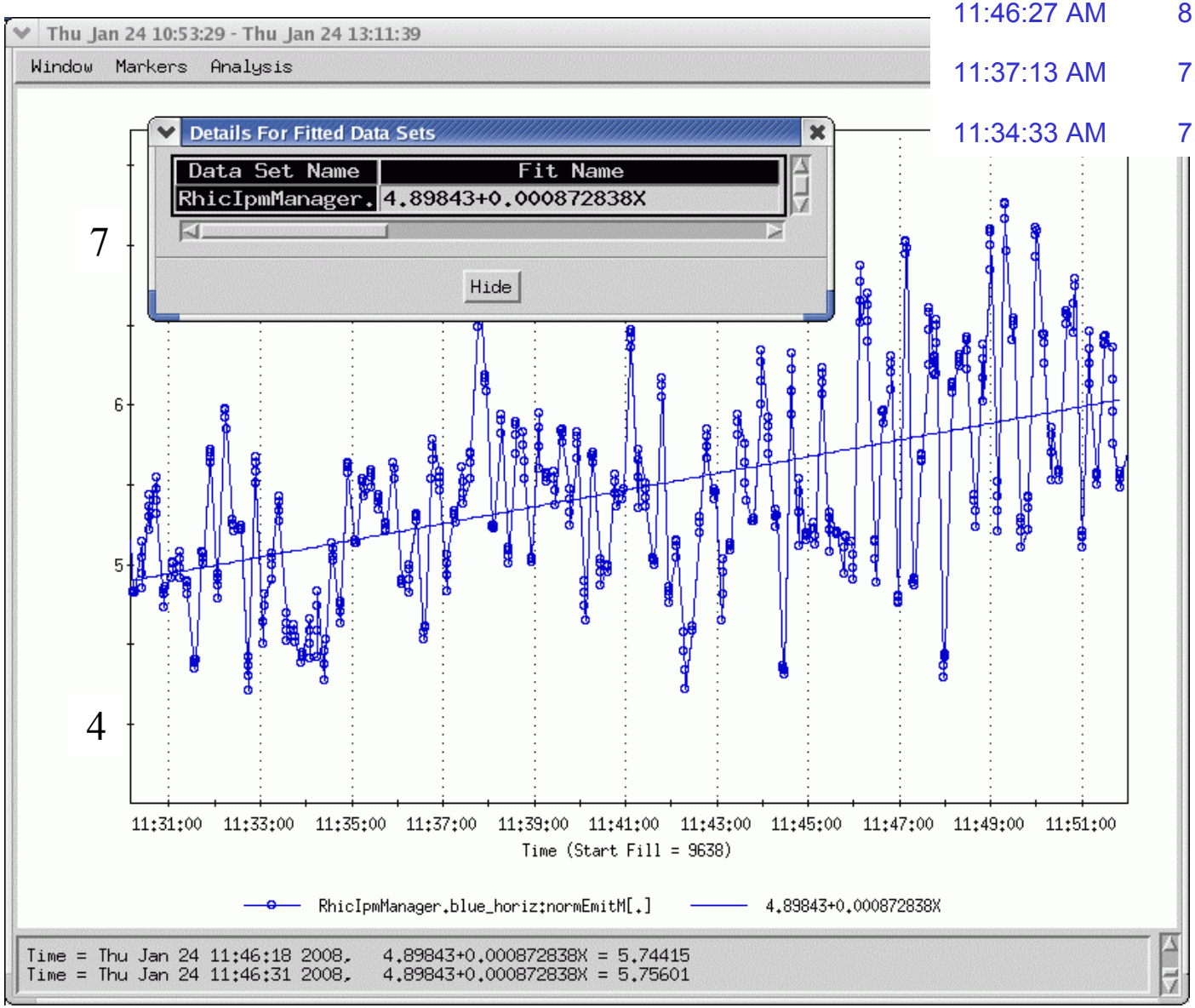
Count Rate

Current Value: 0 | Peak Count Position: 1057 | Clear

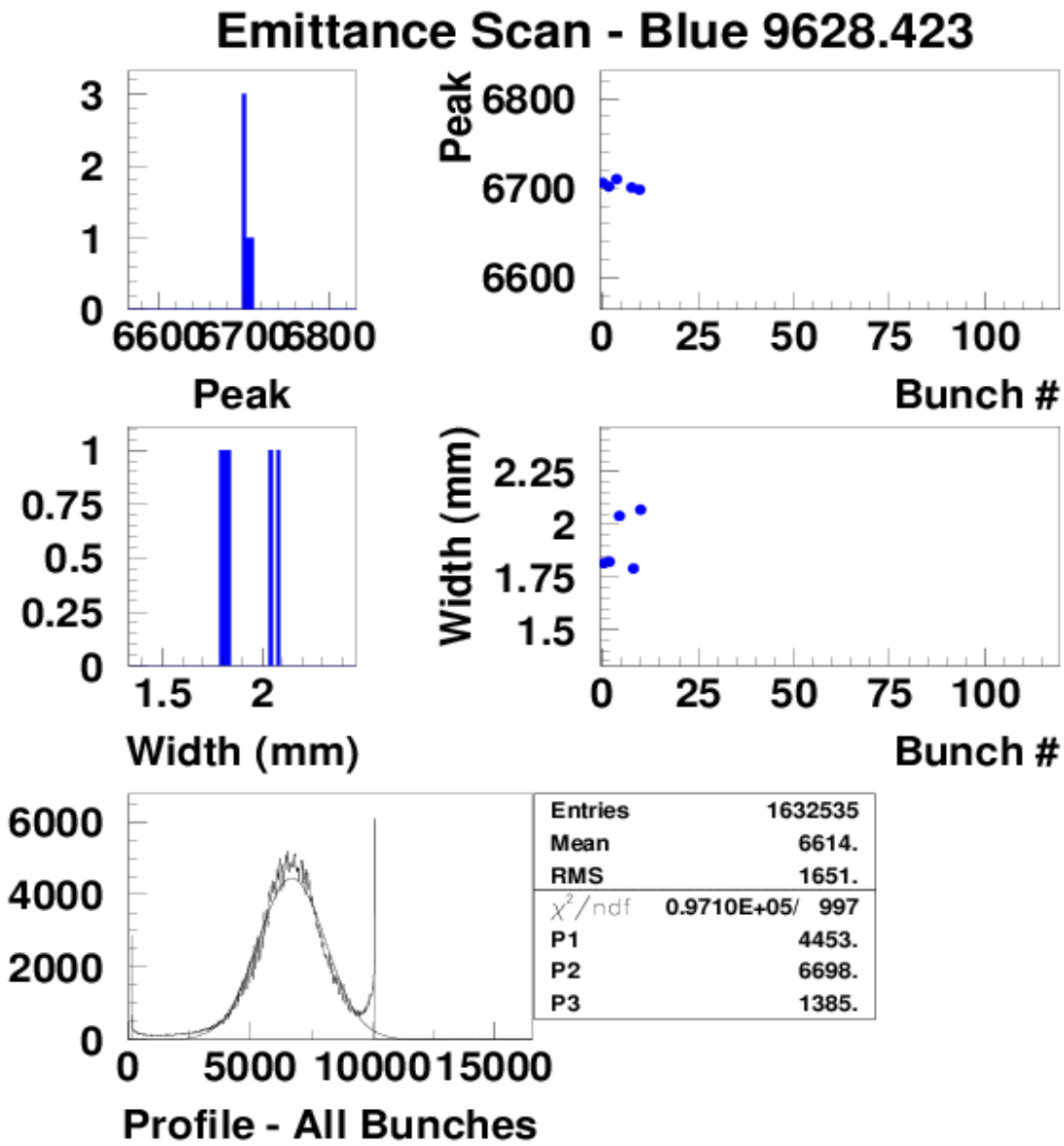


Horizontal Emittance

Time	Polar	IPM	Ratio
11:48:21 AM	8.71	5.860	1.487
11:46:27 AM	8.38	5.750	1.458
11:37:13 AM	7.91	5.270	1.502
11:34:33 AM	7.02	5.130	1.369

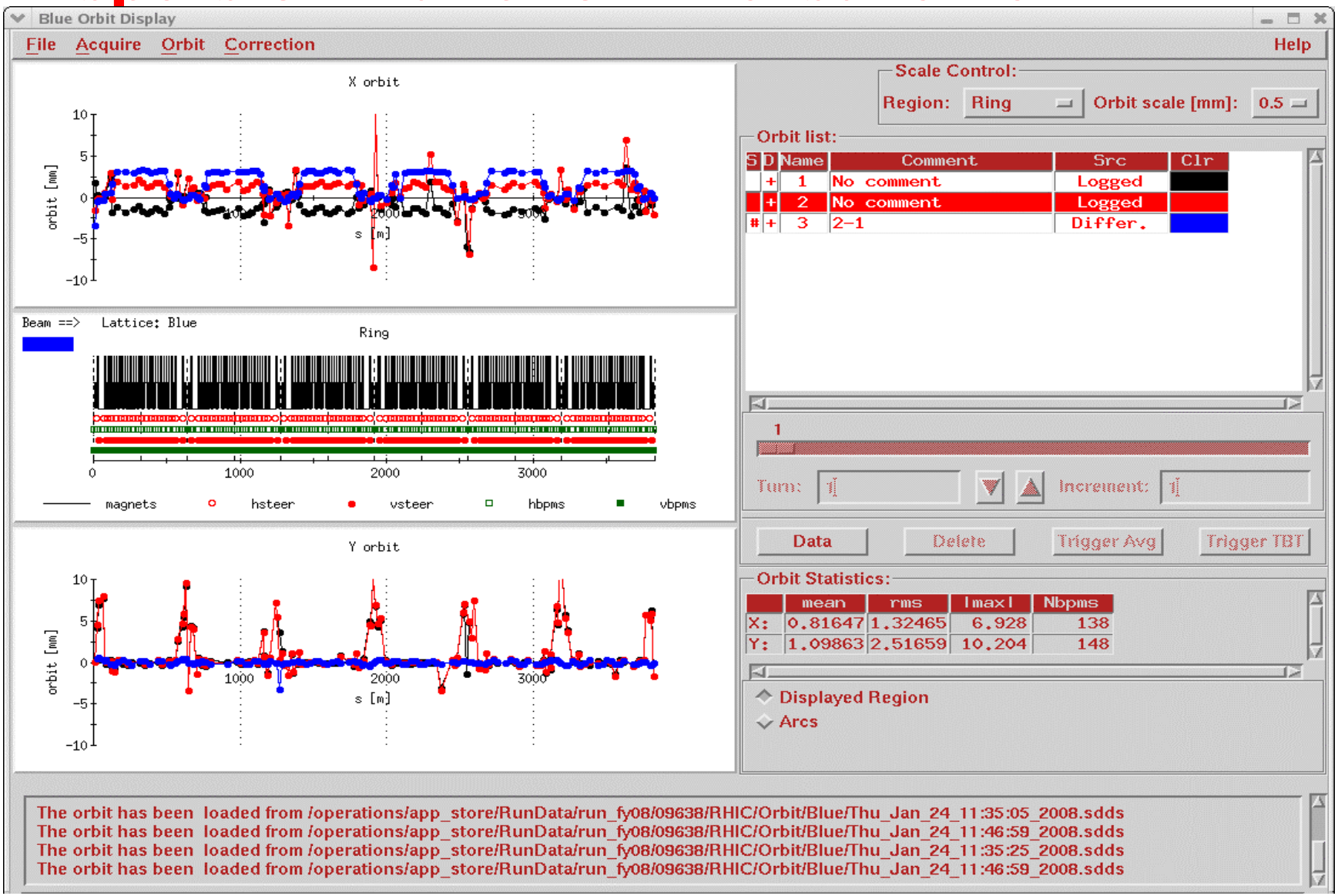


Horizontal Beam Profile (fast mode)



- Only five bunches shown in the plot. 60 bunch mode was used in the analysis code?
- Profile fitting is not good. Need to check the analysis code.
- Analysis is still done offline: large prompt events were recorded and event selection is very slow.
- We should scan with a wider range.

Dispersion Function Measurement



For the radius change of 1.66mm, orbit moved only -0.046mm and -0.058mm in two measurements => D_x=-0.014m or -0.011m. Model gives -0.0116m. Too small to measure. No need to consider dispersion contribution to the profile.

Summary

- Deuteron beam profiles (h & v) were taken with 12 bunches with Polarimeter and IPM.
- The vertical emittance data have not been analyzed yet.
- The horizontal emittance measured by polarimeter is about 40+% larger than the one measured by IPM.
- We can take measurement again at store, preferred with 6-12 bunches.